GDS Associates, Inc.
Engineers and Consultants

- Final -

SUMMARY REPORT OF THE

QUALITY CONTROL ASSESSMENT

FOR THE

FITCHBURG GAS AND ELECTRIC LIGHT COMPANY'S

LOW-INCOME ELECTRIC ENERGY EFFICIENCY PROGRAM

JULY 31, 2002

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I. Introduction

This report describes the methodologies employed and the results of a Quality Control Assessment performed by GDS Associates, Inc. for Fitchburg Gas and Electric Light Company's (FG&E) Electric Low Income Program (Program). As part of an ongoing Low-Income program assessment, GDS was contracted to conduct this on-site assessment in an effort to capture key information regarding the installation and current condition of all program measures. In addition, a brief interview was included to assess customer satisfaction and behavioral changes resulting from the program. This report is the third in a series of three reports that make up the Program Evaluation of FG&E's Electric Low Income Program. The first phase of the Evaluation addressed the program's design and implementation process, and the second phase was a telephone survey designed to determine the current level of awareness among FG&E's low-income customers of the program as well as the levels of participation and satisfaction of those that have participated in the program.

FG&E's Electric Low Income Program provides eligible participants[1] with an energy audit, education on energy saving opportunities, direct installation (at no cost to the customer) of low-cost energy efficiency measures and installation of more substantial energy savings measures (also at no cost to the customer) upon cost effectiveness screening. The measures address all of the major residential end uses (*i.e.*, lighting, refrigeration, heating, air conditioning, and water heating). The implementation and administrative contractor for this program is the Montachusett Opportunity Council, Inc. (MOC). MOC subcontracts to Conservation Services Group, Inc. (CSG) for such implementation services as refrigerator installation, removal, and recycling as well as multi-family audits and installations. It should be noted that MOC is also the agency responsible for delivery of the federal weatherization program to income-eligible residents of the greater Fitchburg area and coordinates the delivery of both programs.

Section II of this report presents a summary of key findings from the Phase III site visits and includes recommendations for FG&E's consideration as implementation of the Electric Low-Income Program continues. Section III is an overview of the methodologies used. Section IV provides details on the results of the on-site inspections and the participant surveys.

[1] Eligible customers are those residential FG&E electric customers at or below 200% of the federal poverty limit.

II. Summary of Key Findings and Recommendations

The site visits conducted with FG&E's low income customers focused on five major areas: 1) Retention and spillover effects as they impact energy savings; 2) Quality of work performed; 3) Impact of educational component; 4) Satisfaction of participating customers and; 5) Lost opportunities. In total, 28 participating low income customer homes were visited. This section includes a summary of the key findings obtained through the on-site inspections and participant surveys.

In general, measure retention remains high with most measures, customers were satisfied with their experience in the program, and the quality of the measures up to two years after installation remains fair. In many homes there were areas of potential savings that may have been missed during the audit and measure installation process. Most often noted lost opportunities include the need for insulation and air sealing. In addition, there were cases where measures were found to have been delivered to the customers' homes but not installed (i.e. CFLs, aerators, showerheads, AC filters).

Those customers that were satisfied with the program cited the no-cost measures as the main reason for their satisfaction. Participants that were not very satisfied with the program cited low energy savings as a result of participation, which could indicate an opportunity in the education component.

The key findings are summarized below by major category and discussed in greater detail in Section IV.

Impact on Savings

Findings related to savings estimates were focused primarily on whether the measures installed through the program were still in place and working (retention rate) and where participants had purchased other energy efficient products or changed their behavior due the program (spillover effect). The resulting values, as shown in Tables 1 and 2, are provided as an indication of program areas that may require attention but are not intended for determination of adjusted gross savings for the Program.

Table 1: Potential Measure Retention

Measure	Per Database	Per Site Visit	Retention Rate
CFL	83	59	71%
Aerators	34	21	62%
Showerheads	13	10	77%
Refrigerators	11	11	100%
AC Filter	11	11	100%
Pipe Insulation*	81 linear feet	81 linear feet	100%

* Nine linear feet was installed in each of nine homes.

Table 2: Potential Measure Spillover

Measures installed After Program Participation	# of Customers	Spillover Percent
CFLs*	4	14%
Halogen Torchiere Replacement	1	4%
Pipe Insulation	1	4%
Weatherstripping	4	14%
Use lower watt incandescent	1	4%
Installed New Windows	2	7%
Total Installing Other Measures	**13**	**46%**

* 14% of participants installed CFLs outside of the program at an average of 1.25 CFLs per household.

As noted above, this research was not explicitly designed as an impact evaluation. Therefore information presented in these two tables on retention and spillover should not be viewed as definitive values for use in adjusting savings. Additional data collection and analysis, outside the scope of this study, would be required to more quantitatively verify the observed and reported retention rates and spillover percentages and to link them to actual program activities.

Quality of Work Performed

The primary vehicle for determining the quality of the installed measures was the on-site evaluator's observations of the current state of the measures received. In addition, while conducting the walk-through of each participant's home, the customer was queried about any anomalies associated with the measure installations. These evaluator observations and customer responses were then converted into a three point rating scale (where 1 = Poor, 2 = Fair, and 3 = Good). Overall, the resulting quality of the work performed through the Program was fair. This marginal assessment of the overall quality of measure installations was due to there being some issue with each of the measure types installed, as described below.

Table 3: Quality of Measure Installations

Measure	Installation Issue	Number of Instances	Average Quality Rating (1=Poor, 2=Fair, 3=Good)
CFL	Delivered but not installed*	5 out of 17	2
Showerheads	Leaks - No Teflon tape used	2 out of 13	1.63
Pipe Insulation	Insulation not installed to first 18 inches of pipe	9 out of 9	1.22
Weatherstripping**	Interfered with door's operation Area not addressed	1 out of 13 1 out of 28	2.48

Insulation: Basement*	Gaps in coverage Area not addressed	1 out of 15 1 out of 15	2.27
Insulation: Attic/Walls*	Gaps in coverage Finish work not completed	1 out of 8 1 out of 8	2.75
TOTAL AVERAGE QUALITY RATING			2.06

* Customers either installed, gave away or may have put in places where savings would not be fully realized (area where lights are used less than 3 hours/day)

** It is important to note that insulation and weatherization findings are attributable to those homes where measures were found, but these measures were reportedly not installed directly through the FG&E program.

CFLs, air conditioner filters, aerators and showerheads were noted to have been left with customers rather than installed in five instances (18%).

Recommendations

- Reinforce the importance of installing all measures as program policy.
- Install showerheads and aerators using a process that includes cleaning the threads of the faucet and applying Teflon tape to the threads prior to threading the new showerhead or aerator into place.
- Install pipe insulation closer to the top of the water heater, using caution not to block the air vent on gas or oil fired water heaters.

Impact of Education Component

To the degree that customers' recollection of conversations regarding energy efficiency is an indication of successful customer education, most respondents remembered speaking with someone about energy efficiency topics, and most found the information useful. Very few recalled receiving any printed materials (i.e., computer-generated printout of audit results, educational information on energy efficiency programs and practices)

Table 4: Education Component

Discussion Recollection	**Topic**							
	Benefits of energy efficiency?		How energy is used in the home?		Explaination of the installed measures?		Suggestions for other energy efficiency actions?	
Recalled Speaking w/ Rep	16	74%	14	64%	14	64%	10	45.5%
Found Info. Useful	12	66%	10	63%	10	58%	7	50%

Less than half of participants (46%) claim to have made behavioral changes concerning energy use since their participation in the program, and most did not recall any discussion of actions that may be taken to save energy and reduce the amount of their electric bill.

Recommendations

- Consider adding brochures or "energy savings hints" type material to the audit in order to increase the education component's impact
- Be certain to generate and leave a copy of the audit printout with customer after audit has been completed, or send a copy of the audit results (along key findings and recommendations) to customer as a follow-up. If the audit software is overly complex it may become less useful to the customer. In this case, a customer friendly format may need to be developed and added to the software.
- Through the program's education component, emphasize that *noticeable* energy savings and bill reductions may take actual changes in patterns of use and will not occur through the installation of just a few CFLs.

Customer Satisfaction

Overall, customers were generally satisfied with the program as illustrated by the 71% of the participants in the sample claiming to be at least "Somewhat happy" with the program, and 93% willing to recommend the program to others. The following table displays the major pros and cons from the customers' point of view.

Table 5: Customer Pros and Cons

Pros	Number of Customers	Cons	Number of Customers
Appreciated the free measures	7	Didn't notice any savings in electric bill or other benefit	5
Appreciated the audit	3	Didn't deliver anything	1
Appreciated the savings	1	Didn't install measures	1
		Didn't complete work	1

The most frequent customer commendation of the program was that of appreciation for the new refrigerator and the most common customer criticism of the program overall was the lack of noticeable savings.

Lost Opportunities

Many opportunities to capture additional fuel blind thermal savings are lost due to the split incentive encountered when structural or common area measures are outside the customers' domain, and the owner has no incentive to improve building efficiency on behalf of his/her tenants.

For those customers that were left with measures to install themselves, often, they did not install them or installed them to improper locations. For example, aerators were sometimes not installed at all while CFLs were installed in locations where the hours of use appeared to be low.

Identified as those situations where incandescent lamps were being used in high use locations or CFLs were being used in low use locations, there were lost CFL opportunities identified within 46% of the homes visited.

There were two lost opportunities identified for "right-sizing" refrigerators in homes where household size and/or lifestyle had changed the necessity to keep the same size refrigerator in the home. In these cases, children had grown and moved out leaving refrigerators under used.

In 15 of the 28 homes (54%), lost opportunities for additional air sealing were identified. Most of these cases occurred in situations were there were door sweeps or weatherstripping that had aged and no longer retained the elasticity to work properly.

Recommendations

- Investigate measures to capture hot water savings from older faucets (i.e., replace old leaky faucets with new faucets)
- As a matter of refrigerator replacement protocol, identify the customer's refrigeration demand and determine if they would prefer a smaller unit.
- Conduct more comprehensive examinations of common points of air infiltration (e.g. doors and windows).

III. Overview of Methodology

The overall goals of this third phase of the Electric Low Income Program Assessment were to: 1) assess any impact on program savings estimates (retention and spillover effects); 2) assess the quality of the installation of energy conservation measures; 3) determine the impact that the education component of the program had on customer behavior and energy savings; 4) determine overall customer satisfaction of those participating in the program; and, 5) assess / identify any lost opportunities.

To address all five areas of concern, two data collection instruments were developed and utilized during each of the twenty-eight sites visited. An on-site interview guide was used to conduct interviews with each participant and a data collection form was used to gather information during a visual inspection of each residence. The questionnaire and site inspection form targeted each of the five areas as follows:

- On-site Interview Guide
  - Impact on Savings
  - Quality of Work Performed (measures installed)
  - Customer Satisfaction

- Impact of Education Component
- Lost Opportunities

➢ Site Inspection Form
- Impact on Savings
- Quality of Work Performed
- Lost Opportunities

Interview Guide Development

An on-site questionnaire was designed to achieve the goals of this assessment. In order to have a single interview guide address all customers, the guide was prepared with a skip pattern so that the customer was asked only those questions that pertained to their level of involvement in the program (the final interview guide is included as Appendix A). The customer interview guide was divided into seven sections as follows:

1. Introduction – Personal identification of the interviewer was made known to the participant as well as GDS Associates' affiliation with Fitchburg Gas & Electric Light Company was established before reiterating the nature and purpose of the site visit.

2. Awareness - The first two questions were relative to program awareness and what led to the customer's participation decision.

3. Measure-Related Questions – Questions were asked relative to the specific measures that the customer received through the program. For each end-use measure category (e.g. lighting, refrigeration, water heating, etc.), questions were asked that targeted information to assess: measure retention, quality of installed measures, and satisfaction with installed measures.

4. Educational Impact – Questions were asked to determine the participants' recollection and understanding of discussions with the person conducting the initial audit and the written material received at the time of the initial visit were asked, as well as whether they found the information useful.

5. Spillover Effects – Any additional energy saving measures installed as a result of their participation in the program, as well as any behavior changes as a result of their experience with the program, were addressed within this section.

6. Program Satisfaction – Customer satisfaction with the program staff, contractors, and the program as a whole were addressed in this section.

7. Demographic – The last section gathered information relative to demographics of the household. For example, questions specific to ownership status (renter/owners),

household size, age, education and income were asked to gain a demographic profile of program participants.

On Site Inspection Form Development

The form used to collect information witnessed in the field was developed to allow structured data collection by allowing ample space for comments and observations to be noted on each of the following measure related topics (the final inspection form is included in Appendix B):

- Lighting
- Water Heating System Data
- Heating System Data
- Building Envelope / Insulation Data (Basement and Attic)
- Weatherstripping
- Refrigerator Data
- Air Conditioning

Each data item on the form was coded to identify which of the five evaluation objectives the particular item was designed to address (e.g. impact on savings, quality of work, education impact, customer satisfaction, and/or lost opportunities.) In addition, a coding system was used to reflect the installation quality of the measures observed in order to allow for a more consistent tabulation of results.

Sample Size

From a database of 1,145 customers (reported to be MOC's total FG&E Low Income Program production delivered through January 2002), a population of customers that participated in the program between April 2000 and April 2001 was selected. Limiting the population to those that participated in the program prior to April of 2001 ensured that it had been at least a year since their program participation and that the measures had been in place for at least one year.

To achieve a reasonable level of representation, we designed for a sample size of 30 customers that had received services during the April 2000 through April 2001 period. A random sample of 150 customers was drawn from the population of 319 participants from April to April, and calls were made to schedule formal site visit appointments. Due to scheduling issues and one "no show" as discussed in more detail below, 28 sites were ultimately visited yielding a respectable 90 percent confidence factor, with a +/- 15% margin of error.

Given the mix of English and Spanish-speaking citizens living in FG&E's service territory, bi-lingual staff within GDS were tasked with scheduling the appointments for on-site inspection and interviews. In the event that a participant did not speak English fluently, provisions were made to have translation available at the time of the site visit to maximize understanding of questions and accuracy of individual responses. There were no cases where additional

translation was needed. In two cases, there were customers that didn't speak English, but in both cases there were fluent English-speaking residents available at the time of the interview.

We attempted to call all of the 150 participants in the sample at least once. In total, there were 164 calls made to schedule site visits resulting in 29 appointments. The breakdown of the major categories included in the final disposition of the scheduling calls is as follows:

Table 6: Final Call Dispositions

No Answer	82
Scheduled Site Visit	29
Answering Machine or Fax	1
Not in Service	11
Wrong Number or Moved	20
Refused to Participate	5
Line busy	2

Because the database of participants included those that had participated two years prior to this evaluation, many numbers were no longer valid. In general, programs with income eligibility requirements often target a segment of the population that changes residencies more often than the population at large. This was evident upon scheduling the site visits where over twenty percent of the calls resulted in wrong numbers, not-in-service notifications or the resident stating that they had moved to a new location but kept their old phone number.

In all, 28 site visits were completed due to one customer that did not keep the scheduled appointment and could not be contacted to schedule another time.

Analysis

Data gathered via the interview guide and the data collection form were evaluated separately using both spreadsheet tabulation and frequency distribution and means using SAS statistical software. Questionnaires were tabulated in a database table and exported to SAS data sets to be analyzed via the generation of variable means and frequency distributions.

IV. Results of On-site Interviews and Quality Assurance Inspection

This section includes the results of the on-site interviews and the quality assurance inspections. The results are broken down into the five researchable areas:

1. Impact on Savings (i.e. Retention and Spillover);
2. Quality of Work Performed;

3. Impact of Education Component;
4. Customer Satisfaction; and,
5. Lost Opportunities.

Impact on Savings

In general, impacts on energy savings through this assessment focused on the effects of perceived retention and spillover. In this case, we refer to retention as the degree to which energy efficiency measures remain in place and functioning after a year or two following installation. Spillover refers to the direct effect that the program has had on the market where a program participant learns about the potential savings from measures installed through the program and follows by purchasing additional measures outside of the program. Since this analysis was not intended to be a formal impact evaluation, readers are cautioned not to use these results as a basis for determining realization rates for adjusting energy savings. Additional, and more comprehensive data collection and analysis would be required if results were to be used for formal impact assessment purposes.

Lighting

During the on-site interviews some respondents claimed not to have received compact florescent lamps (CFLs) through the program, but during the site inspection CFLs were observed in their reported location. Conversely, some respondents claimed that the bulbs were still in place and working, but were not found in their reported location at the time of the inspection. In general, participants did not remember where the bulbs came from, or under which program they were provided.

Based on program records, there were a total of 83 CFLs distributed to the sites included in the sample. On site observations found 69 CFLs in all homes and 59 CFLs in homes that were to receive them. Therefore, a CFL retention rate of 71% was observed. The difference (69 observed – 59 identified as receiving them through the program = 10 CFLs) were deemed "spillover".

In order to arrive at this calculation, the count of CFLs found in homes (69) needed to be adjusted to include only those CFLs that were installed to homes receiving CFLs through FG&E (65). Further refinement was necessary to exclude additional CFLs found in use but that were installed outside the FG&E program, thereby capturing only those CFLs that were installed through the FG&E program and still in the home and working (59).[2]

The results of the interview are slightly different, where 17 of the 28 customers in the sample that received CFLs through the program were asked, "Are the energy saving light bulbs that were installed during the visit still in place and working?", most (88%) claimed that all or most of the CFLs installed were still in place and working. There were occasions where the

[2] Note that although the CFLs were in the home and working, they may have been moved to different locations than what was reported in program files.

survey respondent claimed to have the CFLs in place and working, but the CFLs were not found during the inspection.

There was only one response to the on-site survey that claimed none were still in place and working, and another claimed that some of the CFLs were removed. Although not specifically asked, customers offered explanations for the CFL removal. The more common reasons offered included:

- "I moved it to a higher-use area."
- "It was stolen"
- "I gave it to a relative"

In addition, those that were moved to locations where they were used for longer durations were confirmed in their new locations.

Table 7 illustrates the frequency distribution of CFL retention responses to the survey.

Table 7: CFL Retention

Q3: "Are the energy saving light bulbs that were installed during the visit still in place and working?"		
Responses	**Frequency**	**Percent**
All are in place and working.	10	59%
Most of them are still in and working	5	29%
Only a few of them are still in place and working	1	6%
None of them are still in or working.	1	6%
Total Responses	**17**	**100%**

Although customer responses appear reasonable, evaluator direct field observations were used as the basis for the 71% retention rate for CFLs.

Refrigerators

Program records identified 11 refrigerator replacements in the selected customer homes visited. All of the eleven refrigerators that were installed through the program were still in place and in excellent working condition, resulting in a retention rate of 100%. No "spillover" was observed.

On more than one occasion, inquiry to the use of the refrigerator would have provided greater insight concerning the need for replacement beyond the results of appliance metering. For example, one customer's refrigerator metered within acceptable limits, however, due to lifestyle changes and household size, the refrigerator was larger than what was needed. Downsizing to a smaller refrigerator may have produced additional savings in this case.

In another case, a customer received a new refrigerator to replace a secondary refrigerator kept on a three-season porch. Although the customer stressed that she could not do without the secondary refrigerator, this 22 cubic foot refrigerator was nearly empty and the refrigerator temperature was near the highest setting. In this case further education may have helped to persuade the customer to either discontinue running the second unit until it was needed, or by replacing the older unit with a smaller unit.

In other cases, refrigerators metered within acceptable limits but were in poor condition and nearing the end of their useful life. In order to capture these units, a consideration of age and condition could be added to the refrigerator replacement protocol.

Hot Water-Related Materials

Program records indicate that the sample included the installation of 34 aerators and 13 showerheads. The on-site inspections produced a count of 21 aerators and 10 showerheads. Based on this data, 62% of the aerators and 77% of the showerheads installed were found in place and working after a year or more in service. Again, there were cases where customers stated that the measures were still in place and working, but none were found upon inspection.

Table 8: Aerators and Low-Flow Showerheads: Actual Count of Measures

		Aerators		**Showerheads**	
Measures Received through FG&E Program	Measures Observed	21	(62%)	10	(77%)
	Reported but Not Found	13	(38%)	3	(23%)
	Total	**34**	**(100%)**	**13**	**(100%)**

Exact parallels may not be drawn between the inspection and the interview results due to the fact the interview did not differentiate between aerators and showerheads. However, the on-site inspection results show that the overall retention rate is less for aerators (62%) than it is for showerheads (77%). No "spillover" for faucet aerators or low flow showerheads was observed.

Fifteen of the homes in the sample were observed to have pipe insulation on their domestic hot water supply lines. Contractor records showed that there were nine homes that had received pipe insulation through FG&E's electric low income energy efficiency program. Of the nine homes receiving pipe insulation, each received nine feet of closed-cell polyethylene insulation applied to the domestic hot water supply from the water heater, and all of the insulation is still in place. The remaining 6 homes with domestic hot water pipe insulation were addressed through other unidentified resources.

There were no participants in the sample that received hot water tank wraps through the FG&E program, and only one with a tank that had been wrapped outside of the FG&E program.

When asked whether or not any problems were encountered with the hot water conservation measures, only one of the sixteen participants responding to this question answered affirmatively. In this case the customer was referring to a leaking showerhead, and he removed the showerhead, cleaned the threads and reinstalled it using Teflon tape.

Further, 2 of the 28 participants (7%) stated that they had installed some pipe insulation after participation in the program ("spillover").

Weatherization: Impact on Savings

According to contractor records, only one of the customers visited was to have received weatherization measures through the FG&E program. However, this customer resided in a multi-family unit and did not receive any of the airsealing or weatherization materials. The installation was ordered, but the measures were never installed because all improvements made to the apartment are to be completed under authority of the landlord. The customer cancelled the scheduled installation because proper authorization had not been given.

The site in which the weatherization materials were cancelled was noted to be very drafty and in need of insulation as well as air sealing. Many of the homes visited showed obvious signs of air sealing installations (weatherstripping). In most of these homes, the customer claimed that the installation was done through the program. Although it is likely that these measures were installed through MOC, they appear to have been funded outside of this specific FG&E electric low income energy efficiency program.[3] Nonetheless, those participants that mentioned the installation of weatherization measures through "the program" were asked whether or not the materials were still in place and working. Of the 8 participants responding, 7 (87.5%) stated that they were still in place.

Two customers claimed to have installed air-sealing measures themselves outside of the program and stated that they had done so prior to involvement in the program or would have done so with or without program assistance. The program's spillover effect on weatherization measures is indicated by the 14% of respondents that stated that they had done some air sealing after becoming aware and more energy conscious due to participation in the program. Although weatherization was not funded through FG&E for those sites visited, attributing benefits from the program to this group may still be warranted. The education component was provided through the FG&E's program, and at least 21% of respondents stated that they had installed weatherstripping since their participation in the

[3] Other resources include the U.S. Dept of Energy (DOE) Weatherization Assistance Program, the U.S. Health and Human Services (HHS) Low Income Heating Energy Assistance Program (LIHEAP) and state funded resources such as the Energy Assistance Program and the Heating Emergency Assistance Retrofit Task Weatherization Assistance Program (HEARTWAP).

program. This spillover also highlights the educational benefit of participation. PLEASE RECONCILE THIS 21% VS. THE 14% ABOVE.

Other Items: Impact on Savings

Due to the season during which the investigation was conducted, not all sites that received air conditioner filters were physically examined for filter retention. However, the questionnaire results show that all (100%) of the air conditioner filters that were installed through the program were still in place and working.

Most customers (89% of the sample) received refrigerator coil brushes. Although not asked in the interview, only two customers stated having used it for the purpose of cleaning the refrigerator coils. Others that provided the information noted the following reasons for not using the brush for its intended purpose:

- The coils on their refrigerator were inaccessible either by refrigerator placement or by refrigerator design.
- "Lost the brush."
- "Kids broke it."

In other cases it was evident that customers did not use the brush for its intended purpose as the refrigerator (whether existing or through the program) was found to be in very poor condition and the coils were noted to be very dirty. Based on this information, only 4% of the brushes were observed to be used for their intended purpose and saving energy.

When asked if other energy efficiency measures have been installed following their participation in the program, customers responded as shown in the frequency distribution in Table 9.

Table 9: Spillover

Q41: "Since becoming aware of the program, what other energy efficiency items have you installed without the assistance of the program?"		
Responses	**Frequency**	**Percent**
CFLs	4	14%
Halogen Tourchieres Replacement	1	4%
Pipe Insulation	1	4%

Weatherstripping	4	14%
Use lower watt incandescent	1	4%
Installed New Windows	2	7%
Repaired Leak in Roof	1	4%
Total Installing other Measures	**14**	**50%**

Quality of Work Performed

It was noted on five occasions that customers did not recall anyone installing CFLs, showerheads, aerators, timers, or air conditioner filters, but did recall these smaller measures being delivered, allowing the customer to install the items themselves. One customer presented a zip-lock bag with aerators and a showerhead, stating that this was what was delivered. This customer further commented that she did not know what these items were or what to do with them.

Five (34%) of the thirteen customers that were to receive appliance timers said that they did not receive them and none were found during the site inspection.

To quantify the quality of various measure installations, a rating of 1, 2 or 3 (poor, fair or good) was applied to particular measures.

Lighting: Quality of Installation

As previously noted, the only comment toward the quality of any lighting installation was toward the quality of the light emitted by the CFL itself and not related to contractor installation. From an "installed at all / and in the right places" perspective, an overall quality rating of 2 was assigned by the evaluator for lighting.

Refrigerators: Quality of Installation

Addressing the quality of the refrigerator itself (more than the installation of the appliance), a question was asked, "Have you had any problems with your new refrigerator since it was installed?". Although most participants reported that they had no problems, four reported having some complaint with their appliances' operation. Of the four reporting problems, three reported that the unit was somewhat noisier than their older unit and one stated that it kept the food too cold.

All respondents were very happy with the way in which the old refrigerator was removed and the new one was installed. A visual inspection of the area surrounding the refrigerator confirms the care taken in fitting the new unit in place of the old refrigerator and the return of any cabinetry to its proper location. From this "quality of installation" perspective, an overall quality rating of 3 was assigned by the evaluator for refrigerators.

Pipe Insulation: Quality of Installation

With regards to the installation of pipe insulation, 50% were rated as good, and 50% were rated fair. Those receiving a rating of "Fair" were due to the fact that the insulation would have been more beneficial had it been installed closer to the top of the water heater. In many cases the pipe insulation was installed above the first two feet of copper extending from the water heater. This first two feet is where much of the thermal loss would occur and therefore is where much of the savings is captured. Therefore, from a "quality of installation" perspective, an overall average quality rating of 1.2 was assigned by the evaluator for pipe insulation.

Showerheads / Aerators: Quality of Installation

There were thirteen customers in the sample that where to receive showerheads. Upon inspection it was revealed that three (23%) of these either did not receive the showerheads or they were received but not installed by the contractor. Of those that were installed by the contractor, two received a rating of poor due to leaks following the installation.

In one of these cases, the customer re-installed the measure, thereby correcting the leak. In the other case, the customer removed the low-flow showerhead and replaced it with a new showerhead. In all of the homes where the contractor installed the showerheads it appeared that no Teflon tape was used during the installation.

Due to common problems associated with the installation of aerators and showerheads, a process of cleaning the pipe threads and applying Teflon tape, should be employed within all homes receiving new showerheads and aerators. In summary, from an "installed-at-all and in–the-right-way" perspective, an overall rating of 2was assigned by the evaluator for faucet aerators and low flow shower heads.

Weatherization: Quality of Installation

Although there was only one customer in the sample scheduled to receive weatherization materials through the FG&E program, there were several homes that had weatherization materials installed by MOC through other programs. GDS believes that an assessment of these measures is valuable to FG&E because they have been managed by MOC and should indicate the quality of weatherization measures that are installed as part of FG&E program.

There were eight homes with some insulation installed to attic areas. Five of these were assigned the highest rating given that the insulation was installed to all voids where needed and the work was performed in accordance with quality construction practices. Access panels through kneewalls were installed, and all finish work was conducted with attention to detail where caulking was used to seal the panel and, where appropriate, the panels were painted to match the room's paint color.

The other three received a rating of fair due to minor flaws. For example, in one case a program participant received blown-in cellulose insulation requiring holes to be bored through exterior clapboard siding. Although the insulation work was done and the customer

had noticed a difference in her comfort level during the winter months, the contractor failed to return to complete the task of refinishing the areas where the bored holes were filled.

In no case, was a rating of poor warranted for attic or wall insulation measures.

With regards to basement measures, there were fifteen homes where weatherization measures were applied to basement locations; six (40%) of which received a good rating, seven (47%) received a fair rating and 2 (13%) received a poor rating. Those receiving a good rating had all basement insulation installed properly and thoroughly in accordance with good workmanship practices.

A fair rating was assigned due to inconsistent insulation (i.e., gaps or varying thickness and R-Value) or if small areas where additional insulation would have been beneficial was not installed.

For those assigned a poor rating, the level of quality applied when installing insulation to basement areas was substandard based on both lack of air sealing addressed and poor workmanship. For example, one of the two receiving a poor rating showed some signs of insulation in the basement, however additional insulation between the unheated basement and the first floor, duct sealing, and air-sealing should have been addressed[4]. In addition, forced air heating ducts to the bedrooms were disconnected in the basement.

Similarly, homes showing signs of air-sealing actions were rated based upon the quality of the finish work associated with the weatherstripping and the level of detectable air infiltration using simple air infiltration detector tools (i.e. the "smoke puffer") at door jams, windows, and other areas where the building shell is perforated (e.g. chimney, plumbing, and electrical chases).

With respect to weatherstripping there were two cases that warranted a rating of poor. In one case, weatherstripping was in place from earlier attempts to tighten air infiltration points at door jams. However, the existing weatherstripping was in very poor condition and no longer maintained the elasticity needed to create a tight seal. In the other case, weatherstripping and a door-sweep was removed by the tenant due to the interference with the door's proper closure. Of the remaining nine locations rated for air-infiltration, eight were given a rating of good and three were given a rating of fair. Fair ratings were assigned where the weatherstripping showed some signs of air-infiltration when tested with a smoke puffer.

Table 10, below, shows the overall evaluator ratings for each of the weatherization measures, from a "quality of installation" perspective.

[4] Although the basement was unheated and unfinished, the four-inch gap beneath the walkout basement door should have been closed to prevent the intrusion of moisture, rodents and other pests.

Table 10: Quality Ratings for Weatherization Areas

Area	Rating	Count	Percent with Weatherization.
Attic	Good	5	63%
	Fair	3	38%
	Poor	0	0%
Basement	Good	5	33%
	Fair	8	53%
	Poor	2	13%
Weatherstripping	Good	8	62%
	Fair	3	23%
	Poor	2	15%

Overall Satisfaction with Quality of Work Performed

80% of those responding were either Very Happy or Somewhat Happy with the quality of work performed and materials installed. As shown in Table 11, a question which may help explain the level of customer satisfaction asked during the on-site interview may also help explain the quality of the work performed as seen through the eyes of the participating customer. When asked, "How happy are you with the quality of all work performed and materials installed?", 55% of the respondents stated that they were "Very Happy", 25% claimed to be "Somewhat Happy", 10% claimed that they were "Very Unhappy", while the remaining 10% had no feelings either way.

Table 11: Quality of Work Performed and Materials Installed: Customers' Perspective

Q44I: "Overall, how happy are you with the quaility of the work performed and materials installed?"		
Responses	**Frequency**	**Percent**
Very Happy	11	55
Somewhat Happy	5	25
No Feeling Either Way	2	10

Somewhat Unhappy	0	0
Very Unhappy	2	10
Don't Know	0	0
Total Responses	**20**	**100%**
Missing Responses = 8		

Impact of Education Component

When asked whether participants remembered speaking about energy efficiency items with the person that came to visit them, 74% stated that they had remembered speaking to someone about the benefits of energy efficiency. However, many of these respondents could not remember any details about what was discussed, and their recollection was limited to the topic of "Energy Conservation" and some of the related products. When probed further, some respondents did recall speaking about certain energy efficiency sub-topics as shown in Table 12 below. 74% of respondents recalled speaking about the ***benefits*** of energy efficiency. Fewer respondents, 64%, affirmed recollection of explanations of how energy is used in their home and how the installed measures will help save energy. And a majority (over 34%) of the respondents did not recall any discussion of actions that customers may take into consideration in order to conserve energy and reduce the amount of their average monthly electric bill.

Approximately 66% of those that did recall discussions about the benefits of energy efficiency found the discussions at least "Somewhat Useful" in their efforts to save energy. Hence, about 33% either found this discussion either: "Not useful at all", had "No feelings either way" or "Did not know".

Table 12: Customer's recollection of discussions with program staff and contractors.

Do you remember speaking about the following items with the person who visited you?	**Q36a** Benefits of energy efficiency?	**Q36b** How energy is used in the home?	**Q36c** Explain of the installed measures?	**Q36d** Suggestions for other energy efficiency actions?	**Q36e** Other items discussed?
Yes	16 (74%)	14 (64%)	14 (64%)	10 (45.5%)	1 (33%)
No	6 (27%)	7 (32%)	7 (32%)	11 (50%)	1 (33%)
Don't Know	0	1 (4%)	1 (4%)	1 (4.5%)	1 (33%)
Missing Responses	6	6	6	6	25

How useful was your discussion on each item?	**Q37a** Benefits of energy efficiency?	**Q37b** How energy is used in the home?	**Q37c** Explain of the installed measures?	**Q37d** Suggestions for other energy efficiency actions?	**Q37e** Other items discussed?
Very useful	4 (22%)	4 (25%)	5 (29%)	3 (21%)	2 (40%)
Somewhat useful	8 (44%)	6 (38%)	5 (29%)	4 (29%)	0 (0%)
No feelings either way	4 (22%)	4 (25%)	3 (18%)	3 (21%)	0 (0%)
Somewhat useful	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not useful at all	1 (5.6%)	1 (6.3%)	3 (18%)	2 (14%)	1 (20%)
Don't Know	1 (5.6%)	1 (6.3%)	1 (6%)	2 (14%)	2 (40%)
Missing Responses	10	12	11	14	23

Regarding discussions of "how energy is used in the home" and the "measures being installed", 63% and 58% found the discussions at least "Somewhat useful", respectively.

The fact that more than half of the respondents remembered having discussions with program personnel about various aspects of energy efficiency provides an indication that the program was at least marginally successful in its attempt to educate program participants about energy efficiency.

Written Material

Less than half (only 44%) of the customers visited recalled receiving any written material. Nearly all of those that did recall receiving written material could not describe the items. In the few cases where descriptions were provided, it was clear that most were not referring to educational material, but rather program administration paperwork (i.e. forms, form letters etc).

Table 13: Customer Recollection of Written Material

Q38 Do you remember getting any written material about energy efficiency?	
Yes	12 (44%)
No	10 (37%)
Don't Know	5 (19%)
Missing Responses=1	

Of those who remembered receiving the written information, 67% stated that they were satisfied with the information to the extent that it was found useful in their effort to save energy. Meanwhile, only one respondent expressed dissatisfaction with the information's usefulness.

Table 14: Usefulness of Written Material

Q38B: "How useful was the written information or brochures about energy efficiency?"		
Responses	**Frequency**	**Percent**
Very Happy	4	33.3%
Somewhat Happy	4	33.3%
No Feeling Either Way	3	25%
Somewhat unhappy	0	0%
Very unhappy	1	8%
Don't Know	0	0%
Total Responses	**12**	**100%**
Missing Responses = 16		

It is noteworthy to mention that very few respondents referred to "computer printouts" or paper copies showing results from the home energy audit supposedly conducted at each home. Only 8 (less than 30%) of the 28 respondents to the customer satisfaction question, "How happy were you with the computer report?" answered that they were either "Very Happy" or "Somewhat Happy" (see results summarize in Table 19 in the Satisfaction summary section below). More than 70% claimed either "having no feelings either way" or "Didn't know" (See Table 19). Most of those answering this way did not remember receiving a computer printout.

Although certain written educational materials themselves were not always remembered, some of the content from these items and/or other information conveyed at the time services were provided appears to have remained resident with a few of the customers. There were four cases (14%) where the customer specifically stated having been made more aware of how energy is used in the home and how to use it most efficiently due to their participation in the program.

Behavioral Changes Since Participation

During the site visits, customers were asked whether they've made any behavioral changes since their participation in the program. Of the 26 that responded, less than half (46%) said that they had made changes. The remainder either responded negatively or were unsure of any behavioral changes. The following is a brief list of behavioral changes quoted by those that responded "Yes" to this question.

Table 15: Behavioral Changes through Education

Behavioral Changes	Number of Customers Citing Change
Bought new bulbs [CFLs]	1
Got rid of all elec. Clocks	1
Unplug TV/VCR [to save on standby power]	1
Lessen hours of use for lights and TV.	1
Shut lights off more often or when not used.	3
Educate children to shut off lights/TV when not used.	1
Make more certain to shut doors tightly and completely	1
Turn off TV when not home.	2
Use less hot water by taking shorter showers.	1
Use timers	1
Turn off heat when away	1

In addition, several customers noted that they had never considered cleaning the coils of their refrigerator and now do so on a regular basis using brushes provided through the program.

Customer Satisfaction

Lighting

In general, customer satisfaction with the CFLs received remains high. Of the 17 customers that received CFLs, 82% were at least "Somewhat Happy" and the remaining 18% had no feelings either way.

Table 16: Overall Satisfaction with CFLs

Q6: "Overall, how happy are you with the energy saving light blubs?"		
Responses	**Frequency**	**Percent**
Very Happy	10	59%
Somewhat Happy	4	23%
No Feeling Either Way	3	18%
Total Responses	**17**	**100%**
Missing Responses = 11		

Only 2 customers cited having problems with their new bulbs. The follow-up question asked about the nature of these problems. While one customer noted that the CFL was too dim, the other stated that his problem was that it was stolen. Therefore, only one noted a lack of satisfaction with the product or its installation.

Also, one particular customer did not have any complaints with the CFLs she received through the program but she did offer her disappointment with the fact that there were no CFLs small enough to fit into some of her other fixtures.

Refrigeration

Overwhelmingly, program participants receiving refrigerators were either "Somewhat Happy" or "Very Happy" with the performance of their new refrigerator. Further, 100% of those receiving new refrigerators were "Very Happy" with the way in which the old one was removed and the new one installed.

Table 17: Refrigerator Satisfaction

Q14: "Overall, how happy are you with the performance of your energy efficient refrigerator?"		
Responses	**Frequency**	**Percent**
Very Happy	8	80%
Somewhat Happy	2	20%
No Feeling Either Way	0	0%
Somewhat unhappy	0	0%
Very unhappy	0	0%
Don't Know	0	0%
Total Responses	**10**	**100%**
Missing Responses = 18		

Table 18 displays the level of customer satisfaction with various areas of program delivery. In general participants expressed satisfaction with the way in which the program was delivered. However, it may be noted that the one area were participants expressed their dissatisfaction is the lack of energy savings associated with the program.

Table 18: Customer Satisfaction Level Concerning Various Program Areas

Q44a-Q44l (# of Respondents)	Very Happy 1	Somewhat Happy 2	Neutral 3	Somewhat Unhappy 4	Very Unhappy 5	Don't Know
Process for Scheduling Audit (28)	13 (46%)	9 (32%)	5 (18%)	1 (4%)	0 (0%)	0 (0%)
Initial Visit (28)	14 (50%)	9 (32%)	4 (14%)	1 (4%)	0 (0%)	0 (0%)
Attitude of Audit Contractor (28)	16 (57%)	7 (25%)	3 (11%)	0 (0%)	0 (0%)	2 (7.1%)
Computer Report and Explanation of Energy Use (28)	6 (21%)	2 (7%)	2 (7%)	0 (0%)	2 (7%)	16 (57%)
Usefulness of Energy Information (28)	7 (25%)	8 (29%)	6 (21%)	1 (4%)	0 (0%)	6 (21%)
Energy Saving Recommendations (28)	4 (14%)	7 (25%)	6 (21%)	0 (0%)	0 (0%)	11 (39%)
Convenience of Scheduling Second Visit (28)	10 (36%)	5 (18%)	0 (0%)	0 (0%)	0 (0%)	13 (46%)
Attitude of Contractors on Second Visit (28)	9 (32%)	5 (18%)	2 (7%)	0 (0%)	0 (0%)	12 (43%)
Quality of All Work Performed (27)	11 (41%)	5 (19%)	2 (7%)	0 (0%)	2 (7%)	7 (26%)
Helpfulness of Program Staff (28)	15 (54%)	8 (29%)	4 (13%)	0 (0%)	0 (0%)	1 (4%)
Electric Bill Savings from Program (28)	5 (18%)	2 (7%)	7 (25%)	2 (7%)	7 (25%)	5 (18%)
Program Overall (28)	14 (50%)	6 (21%)	7 (25%)	1 (4%)	0 (0%)	0 (0%)

In the last list of questions aimed at customer satisfaction customers were asked, on scale of 1 to 5 (where, 1=Very satisfied, 2=Somewhat satisfied, 3=Neutral, 4=Somewhat dissatisfied and 5=Very dissatisfied), how happy they were the program overall. A majority of the customers (71%) stated that they were at least "Somewhat satisfied" with the program overall, and only one respondent expressed dissatisfaction. The next question (as summarized in Table 19) asked customers to state a reason for their response (positive or

negative) to the preceding question. The following table lists the reasons for the various responses. Note that many negative comments reflect reasons for a "Somewhat satisfied" rating and not a perfect rating of "Very satisfied".

Table 19: Reasons for Customers' Satisfaction Rating

Pros	Number of Customers	Cons	Number of Customers
Appreciated the audit	3	Didn't complete work	1
Appreciated the free CFLs	2	Didn't deliver anything	1
Appreciated the free energy efficiency measures	1	Didn't get much out of the program.	1
Appreciated the free refrigerator	4	Didn't install measures; simply left them	1
Appreciated the savings from the new refrigerator	1	Didn't make any dramatic difference in elec bill	1
Convenient, pleasant, helpful and informative	1	Didn't notice any savings	3
Never though of cleaning under fridge	1	No smaller CFLs.	1
Peace of mind knowing that house is as efficient as possible	1	Could use a main office in Fitchburg/frustrated calling NH for FG&E issues/concerns.	1
Program helped out when assistance was needed.	1	More weatherstripping discussed, but not installed.	1
Very happy that the work is finally done. (Though not w/o damage to water pipe)[5]	1		

Further, customers also expressed dissatisfaction during the site visit by commenting that the contractor told them that they would return to complete various tasks and to install weatherization. In some of these cases, customers claimed to have not received a phone call or a follow-up visit to complete necessary items. In other cases, customers simply took it upon themselves to complete necessary tasks. For example, one customer removed a program-installed showerhead, cleaned the threads and replaced the fixture using Teflon tape

[5]Although, the customer did not receive measures through FG&E, insulation at the sills of a particular home was conducted by MOC contractors. The customer complained that the water main was found broken following the contractor's visit. This customer believes that the contractor was responsible for the damage. Upon inspection it appears that the customer's claim was possible given that the water main was located directly beneath the sill where work was being performed. However, there was no clear evidence that linked the contractor to the damage. Although the customer was very pleased the insulation work that was done, she was not pleased with the contractor's attitude.

to stop the leak. Nonetheless, this customer still claimed to have been satisfied with his experience in the program.

Another key indicator of customer satisfaction is their willingness to recommend the program to others. As shown the following table, of the twenty-eight customers that were asked whether they would recommend the FG&E program to others, 26 (93%) responded affirmatively that they would recommend the program. Meanwhile, unable to bring themselves to speak negatively about the "nice gentleman that came out to see them", the remaining two respondents answered that they "Did not know" whether they would refer others to the program. Hence, participants are generally satisfied with the program overall.

Table 20: Recommendation of Program to Others

Q46: "Would you recommend the program to others?"		
Responses	**Frequency**	**Percent**
Yes	26	93%
No	0	0%
Don't Know	2	7%
Total Responses	**28**	**100%**
Missing Responses = 0		

Lost Opportunities

In general, several sites reflected the need to better coordinate with other programs to accommodate low-income customers living in multi-family buildings with weatherization needs. In many of these cases, units were in need of air sealing and insulation, but customers were precluded by lease agreement (written or verbal) from authorizing improvements to the structure. It appeared in most cases that the building owners had little incentive to make these types of improvements to their properties because the tenants pay the utility bills. It seems that there may be lost opportunities in buildings that have 1-4 units because they would not be served by the multifamily component of the Low Income Program.

Lighting: Lost Opportunities

There were 13 homes (46%) where lost opportunities for kWh savings from lighting measures were identified. In a lamp-by-lamp total, there were 38 individual locations where lost opportunities were found in the form of incandescent lamps being used in locations where the lights were reported to be used for at least three hours per day. Some of these were noted in places where the program files indicated that CFLs had been installed in that

particular location. However, in cases where the customer was left with the CFLs to install themselves, they were not always installed in the most appropriate location. For example, CFLs were found used in bedrooms where the customer stated low hours of use rather than obvious higher use areas.

Hot Water-Related Materials: Lost Opportunities

The most common lost opportunities to conserve energy via hot water related items were those where there were no aerators and low-flow showerheads in place due to there being older, high volume fixtures that could not be retrofitted. This occurred in approximately 20% of the homes visited and represents a lost opportunity to capture hot water savings from older faucets in the service area. However, unless water savings can be considered, it would be difficult to justify installation of completely new fixtures based on electric water heating savings alone.

At each of the nine properties receiving pipe insulation from MOC, there were lost opportunities because the first 12 to 18 inches of the hot water supply line directly coming off the water heater was left uninsulated. In addition, there were several places where the basement location of the water heater was on a dirt floor, or where there were open or cracked windows and very little thermal protection from exterior elements. These locations presented opportunities to do tank wraps or install additional pipe insulation beyond the nine feet allotted through the program.

Refrigerator: Lost Opportunities

Through appliance metering, visual inspection of the refrigerators' condition and an assessment of the demands placed upon the refrigerator due to lifestyle changes, 5 sites were identified where opportunities existed for additional savings. In two cases the number of people residing at the address was significantly reduced (e.g., grown children recently moved out) such that the replacement refrigerator could have been smaller. The other instances involved refrigerators that were in poor condition, including deteriorated seal gaskets. In one of these cases where metering was possible, the metering results did not reflect excessive use but the condition seemed to warrant replacement. Also, in one case, a "second" refrigerator (located on the customer's porch) was replaced. Instead, this customer might have been advised to unplug the older unit and use it only when needed.

Weatherization: Lost Opportunities

As noted earlier, there were a number of instances where there was an observed need for additional air sealing and insulation. Through better coordination with other programs these opportunities for additional weatherization savings could be captured. There were 15 residences (54%) where lost opportunities for additional weatherization actions were identified. In most of these cases there were opportunities for weatherstripping and air sealing around windows and insulation between the first floor of living area and an unfinished, unconditioned basement below.

In addition to the previously noted observations through site inspections, the survey contained a question which solicited customers for their opinion on items which were not received through the program but would have assisted them in their efforts to use energy more efficiently. Ten respondents noted that there were other items or information that would have helped them in their efforts to save energy. The following is a list of customer responses:

- Insulation and windows
- Interior storm windows
- Washer/dryer
- Lamps to fit kitchen 40-60 watt globes
- More bulbs (different sizes)
- New stove (electric)
- Quilts
- Refrigerator
- Replace high use T-12 in kitchen & over living room windows
- Weatherstripping
- Windows
- Waterbed insulation

Customer Demographics

A series of general demographic questions were asked of all survey participants, the results of each question are included in Tables 21-25 below. The results included in each table show the percentage of all customers responding as well the mean value for responses, where applicable.

No specific trends were identified.

Table 21: Occupancy Type

Q47: "Do you own or rent your home?"		
Responses	**Frequency**	**Percent**
Own	12	43
Rent	16	57
Total Responses	**28**	**100%**
Missing Responses = 0		

Table 22: Household Size

Q48: "Number of year round residents in home?"		
Responses	**Frequency**	**Percent**
1 Person	10	36
2 People	4	14
3 People	3	11
4 People	4	14
5 People	4	14
6 People	2	7
7 People	1	4
Missing Responses = 0		

Mean number of persons residing year round: 2.93 People per household.

Table 23: Household Age 65 or Older

Q49: "How many people residing here are age 65 or older?"		
Responses	**Frequency**	**Percent**
0 People	16	57
1 Person	9	32
2 People	2	7
3 People	4	4
Missing Responses = 0		

Mean number of persons 65 or older: .57 per household

Table 24: Household Age 18 or Younger

Q50: "How many people residing here are age 18 or younger?"		
Responses	**Frequency**	**Percent**
0 People	16	57
1 Person	2	7
2 People	3	11
3 People	6	21
4 People	1	4
Missing Responses = 0		

Mean number of persons 18 or less: 1.07 per household.

Table 25: Level of Education

Q51: "What was the highest level of schooling that you completed?"		
Responses	**Frequency**	**Percent**
Some high school or less	8	29
High school graduate	11	39
Some college	5	18
Technical/Trade/Vocational/Associates degree	3	11
Four year college graduate	1	4
Post-graduate or professional degree	0	0
Total Responses	**28**	**100%**
Missing Responses = 0		

Table 26: Household Income

Q52: "What range would estimate your household's annual income was last year?"		
Responses	**Frequency**	**Percent**
Less than $5,000	1	4
Between $5,000 and $10,000	10	40
Between $10,000 and 20,000	8	32
Between $20,000 and $30,000	3	12
Between $30,000 and $40,000	2	8
Between $40,000 and $50,000	1	4
Over $50,000	**28**	**100%**

Missing Responses = 0

Appendix A: On-Site Interview Guide

Fitchburg Gas & Electric Light Company
Conservation & Education
Program Evaluation

Eligible Customer On-Site Interview Guide (1/28/02)

Background: *The purpose of these interviews is to: assess the quality of the work performed through FG&E's Electric Residential Low Income Program; gauge the impact of the educational component of the program; determine customer satisfaction with the program services provided and measures installed; identify any impact on savings estimates by identifying potential measure retention issues and spillover effects; and highlight any lost opportunities. If customers would like to contact FG&E for any reason, they will be instructed to call the following phone number* 1-888-301-7700 (FG&E's Customer Service Center).

Please note: Prior to arriving at the home, the customers' installation records will be reviewed and the measures that were installed at the customers' address will be noted in the table on the following page. Subsequently, each survey will be customized so that all irrelevant measure questions are crossed out. This will allow the questionnaire to be administered most efficiently and effectively.

Responses in parentheses indicate they should not be read to the interviewee, only recorded as appropriate.

INTRODUCTION

Hello, my name is _____ and I am working on behalf of Fitchburg Gas and Electric Light Company. May I speak with <<***Customer Name>>***? As I mentioned when scheduling this visit, I'm visiting with Fitchburg Gas and Electric customers like you to find out how well the Company's electric energy savings programs are meeting their goals, the quality of the work that was done and to find out what you liked or disliked about the program. Before doing my inspection of the work that was done in your house, I had a few quick questions I was hoping you could answer. Your answers will be kept strictly confidential. We greatly appreciate your help in this study.

[IF NECESSARY] Is there someone else at home that might know more about the energy saving work that was done? [NOTE: If referred to someone else, interviewer should repeat introduction].

Q1. How did you hear about the Program? [ONLY READ LIST IF ASSISTANCE NEEDED FOR RESPONSE]

1. (Telephone call)
2. (Advertisement included in your electric bill)
3. (Post-card or letter)
4. (Newspaper article or advertisement)
5. (Poster or sign at a local store or a community center)
6. (Radio)
7. (TV)
8. (Web site and/or computer)
9. (From utility in response to billing inquiry)
10. (Social service agency)
11. (From a neighbor, friend or relative)
12. (Landlord)

97.(Other _____)
98.(Don't know)

Q2. I'm going to read you a few possible reasons for participating in Fitchburg Electric's energy conservation programs. On a scale of 1to 5 (where 1 is a very important reason and 5 is not at all important), please tell me how important each reason was when you chose to participate in the program?

Q2A.	To save money on your electric bill	1	2	3	4	5	9
Q2B.	To save energy	1	2	3	4	5	9
Q2C.	Because the materials were going to be installed for free	1	2	3	4	5	9
Q2D.	To make your home more comfortable	1	2	3	4	5	9
Q2E.	To make your home safer	1	2	3	4	5	9
Q2F.	Because friends or relatives recommended it	1	2	3	4	5	9
Q2G.	To increase the value of your home	1	2	3	4	5	9
Q2H.	To help protect the environment	1	2	3	4	5	9
Q2I.	To learn how to improve your home's energy efficiency	1	2	3	4	5	9
Q2j.	Other _____	1	2	3	4	5	9

Now, I would like to ask you a few questions about the energy saving materials that were installed in your home when the person came to visit.

THE ELECTRIC COMPANY'S RECORDS INDICATE THAT YOU HAD THE FOLLOWING MEASURES INSTALLED (To be filled in prior to visit):

Location	Description	Quantity

MEASURE-RELATED QUESTIONS

QUALITY AND RETENTION [Regarding questions 3 – 31, the interviewer will ask questions on only those measures that were installed – prior to the site visit, the interviewer will review customer records and eliminate those measures & questions that don't apply]

Concerning the energy savings light bulbs:

Q3. Are the energy saving light bulbs that were installed during the visit still in place and working?

1. All of them are still in and working
2. Most of them are still in and working
3. Only a few of them are still in and working
4. None of them are still in or working - they've all been removed
98. (Don't know)

Q4. Have you had any problems with the new energy saving light bulbs?

1. Yes
2. No
98. (Don't know)

If *No,* skip question 5.

Q5. What type of problem(s) have you had with the light bulbs? (DO NOT READ, RECORD ALL THAT APPLY)

1. (Light is too dim.)
2. (Light is too bright.)
3. (Light is bad quality, things don't look right - too yellow, too blue, etc.)
4. (Bulb takes too long to get started.)
5. (Bulb does not fit properly into fixture.)
6. (Bulb flickers.)
97. (Other _____)

Q6. Overall, how happy are you with your energy saving light bulbs?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Comments: _____

Concerning the energy saving lighting fixtures:

Q7. Are the fixtures that were installed during the visit still in place and working?

1. Yes
2. No
98. (Don't know)

Q8. Have you had any problems with the energy saving fixtures?

1. Yes
2. No
98. (Don't know)

IF NO, Skip Question Q9

Q9. What type of problem(s) have you had with the lighting fixtures? (DO NOT READ, RECORD ALL THAT APPLY)

1. (Light is too dim.)
2. (Light is too bright.)
3. (Light is bad quality, things don't look right - too yellow, too blue, etc.)
4. (Takes too long to get started.)
5. (Fixture is not attractive.)
6. (Light flickers.)
7. (Fixture has been broken.)
98. (Other _____)

Q10. Overall, how happy are you with the performance of your energy saving light fixture(s)?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Comments: _____

Concerning your energy saving refrigerator:

Q11. Have you had any problems with your energy saving refrigerator?

1. Yes
2. No
98. (Don't know)

IF NO, then skip Q12

Q12. What type of problem(s) have you had with the refrigerator? (DO NOT READ, RECORD ALL THAT APPLY)

1. (Has malfunctioned and needed service.)
2. (Internal size, it is smaller than the old one and/or not set up the same way.)
3. (External size, it doesn't fit properly in the space.)
4. (It doesn't keep the food cold and/or the frozen food frozen.)
5. (It keeps the food too cold.)
6. (It is noisy.)
98. (Other _____)

Q13 Overall, how happy were you with the way that the old refrigerator was removed and the new one installed?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Comments:_____

Q14. Overall, how happy are you with the performance of your energy saving refrigerator?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Comments: _____

Concerning the energy saving hot water related materials:

Q15. Are the showerheads and aerators that were installed during the visit still in place and working?

1. Yes
2. No
98. (Don't know)

IF YES, then skip Q16

Q16. Why are the showerheads and aerators no longer installed? [DO NOT READ - RECORD ALL THAT APPLY]

1. (New showerhead/aerators leaked.)
2. (Water flow from new showerhead/aerator was too slow.)

3. (Did not like the look of the showerhead/aerators)
97. (Other _____.)

Q17 Have you had any problems with any of the other hot water related materials?

1. Yes
2. No
98. (Don't know)

IF NO, then skip Q18

Q18 What type of problem(s) have you had? (DO NOT READ, RECORD ALL THAT APPLY)

1. (Hot water temperature was too low – turned it back up.)
2. (New water heater does not heat water up fast enough.)
3. (Service required on water heater since the program site visit.)
18a. (Other _____.)

18b. (Other _____.)

18c. (Other _____.)

18d. (Other _____.)

18g. (Other _____.)

Q19 Overall, how happy are you with the performance of your hot water saving materials?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Comments: _____

Concerning your heating system:

Q20Have you had any problems with the heating system since the repair /replacement?

1. Yes
2. No
98. (Don't know)

IF NO, then skip Q21

Q21. What type of problem(s) have you had? (DO NOT READ, RECORD ALL THAT APPLY)

1. (New/repaired heating system has needed further service/repair.)
2. (Heating system does not seem to heat the home as well as before.)
3. (Heating system is noisier.)
97. (Other _____.)

Q22. How happy were you with the way work was done on your heating system, including the scheduling and installation/repair procedure?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Q23 Overall, how happy are you with the performance of your repaired/replaced heating system?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Q23a. Comments:_____

Concerning the weatherization related materials:

Q24 Are the other weatherization materials that were installed during the visit still in place and working?

1. Yes
2. No
98. (Don't know)

Q25. Have you had any problems with the weatherization materials?

1. Yes
2. No
98. (Don't know)

IF NO, then Skip Q26

Q26 What type of problem(s) have you had? (DO NOT READ, RECORD ALL THAT APPLY)

1. (Insulation installed in the attic is in the way of storage space.)
2. (Interior storm windows are loose and/or unattractive.)
3. (Weatherstripping and/or caulking is coming loose.)
4. (New thermostats are hard to read and/or understand.)
97. Other
Q26a. _____.)

Q27 In the winter months, do you feel any difference, warmer or more comfortable, as a result of the weatherization work that was completed as part of this program?

1. Definitely warmer and more comfortable.
2. Maybe warmer and more comfortable.
3. About the same.
4. Maybe a little less comfortable.
5. Definitely less comfortable.
6. Have not gone through a winter since the program visit
98. (Don't know)

Q28 How happy were you with the way work was done on installing your new weatherization materials, including the scheduling and actual installation procedure?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Q29 Overall, how happy are you with the performance of your new weatherization materials?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Q29a. Comments:
_____

Concerning other installed materials:
Q30 Are the following materials that were installed during the visit still in place and working?

Q30a. Filter for air conditioner Yes No Don't Know

Q30b.	New window air conditioner	Yes	No	Don't Know
Q30c.	Water bed cover	Yes	No	Don't Know
Q30d.	Replacement mattress for removed waterbed	Yes	No	Don't Know
Q30e.	Other _____	Yes	No	Don't Know

Q31. Have you had any problems with the following materials?

Q31a	Filter for air conditioner	1. Yes	2. No	98. Don't Know		
Q31b.	New window air conditioner	1. Yes	2. No	98. Don't Know		
Q31c.	Water bed cover	1. Yes	2. No	98. Don't Know		
Q31d.	Replacement mattress for removed waterbed	1. Yes	2. No	98. Don't Know		
Q31e	Other _____	1. Yes	2. No	98. Don't Know		

IF NO, then skip Q32

Q32. What type of problem(s) have you had? (DO NOT READ, RECORD ALL THAT APPLY)

1. (New mattress is uncomfortable.)
2. (Mattress cover was a nuisance to move around.)
3. (Air conditioner does not work as well.)

32a. (Other _____.)
32b. (Other _____.)
32c. (Other _____.)
32d. (Other _____.)
32e. (Other _____.)

Q33 On a scale of 1 to 5 where 1 is Very Happy and 5 is Very Unhappy; Overall, how happy are you with the *way work was done to install* the following materials, including the scheduling and actual installation procedure?

Q33a.	Filter for air conditioner	1	2	3	4	5	Don't Know
Q33b.	New window air conditioner	1	2	3	4	5	Don't Know
Q33c.	Water bed cover	1	2	3	4	5	Don't Know
Q33d.	Replacement mattress for removed waterbed	1	2	3	4	5	Don't Know
Q33e.	Other	1	2	3	4	5	Don't Know

Q34. On a scale of 1 to 5 where 1 is Very Happy and 5 is Very Unhappy; *Overall*, how happy are you with the following materials installed?

Q34a.	Filter for air conditioner	1	2	3	4	5	Don't Know
Q34b.	New window air conditioner	1	2	3	4	5	Don't Know
Q34c.	Water bed cover	1	2	3	4	5	Don't Know
Q34d.	Replacement mattress for removed waterbed	1	2	3	4	5	Don't Know
Q34e.	Other	1	2	3	4	5	Don't Know

Q34M. Comments: _____

IMPACT OF EDUCATIONAL COMPONENT

Q35. Thinking back to when your energy efficiency measures were installed, do you remember *speaking* about energy efficiency items with the person who visited you?

1. Yes
2. No (If *No*, skip Question 36)
98. Don't know

36a.. Do you remember discussing the *Benefits of Energy Efficiency* (i.e., lower bills, increased comfort/safety)?
1. Yes
2. No
98. Don't know

36b.. Do you remember an *explanation of how energy is being used in your home and what you might be able to do to use it more efficiently?*
1. Yes
2. No
98. Don't know

36c. Do you remember an *explanation of the measures being installed and how to use them?*
1. Yes
2. No
98. Don't know

36d. Do you remember any other *suggestions for other energy efficiency actions you can take?*
1. Yes
2. No
98. Don't know

36e. Do you remember any *other items discussed*?
1. Yes
2. No
98. Don't know

Q36e1 Please describe: _____

Q37. On a scale of 1 to 5, where 1 was Very Useful and 5 was Not Useful At All, please rate how useful your discussion was on each of the items you mentioned above. *[Note to Interviewer – only rate the ones identified by customer in Q36a-e]*

37a. Benefits of Energy Efficiency (i.e., lower bills, increased comfort/safety)
1 2 3 4 5

37b. Explanation of how energy is being used in your home and what you might be able to do to use it more efficiently
1 2 3 4 5

37c. Explanation of the measures being installed and how to use them
1 2 3 4 5

37d. Suggestions for other energy efficiency actions you can take
1 2 3 4 5

37e. Other items
1 2 3 4 5

Q38. Thinking back to when you were first visited by the energy efficiency person for this program, do you remember getting any *written information or brochures* about energy efficiency?

1. Yes
2. No (If *No* or *Don't Know*, skip Question 38)
98. Don't know

Q38a. If Yes, Please describe the information items you received: _____
_____
_____

Q38b. On a scale of 1 to 5, where 1 was Very Useful and 5 was Not Useful At All, please rate how useful this information was.
1 2 3 4 5

SPILLOVER EFFECTS

Q39. Since you became aware of the program have you installed any other energy efficiency items without the program assistance?

1. Yes
2. No
98. Don't know

If NO, then Skip Q41.

Q41. What energy efficiency items have you installed without the assistance of the program?
1. CFLs
2. Fixtures
3. Halogen Torchieres replacement?
4. Insulation
5. Pipe Insulation
6. Weather stripping
7. Energy Star rated refrigerator
8. Other

Q41a. How many CFLs? _____
Q41b. How many fixtures/torchieres? _____

Q42. Have you made any other changes in your behavior to save energy?

1. Yes
2. No
98. Don't know

If NO then go to Q42a.

Q42a. What behavior changes have you made since participating in the program?

Please describe: _____
_____

LOST OPPORTUNITIES

Q43. Is there any other information or are there other energy savings items not provided in the program, that you would have found helpful in your efforts to save energy and reduce your electric bill?

1. Yes
2. No
98. Don't know

Q43a. If Yes, please describe: _____

Now, I would like to ask you just a few questions about how happy you were with the energy savings program overall.

PROGRAM SATISFACTION QUESTIONS

Q44. Please tell me how happy you were with each of the following parts of Fitchburg's energy savings program using a scale of 1 to 5, where 1 is extremely happy and 5 is very unhappy. How happy were you with the _____?

1. Very happy
2. Somewhat happy
3. No feelings either way
4. Somewhat unhappy
5. Very unhappy
98. (Don't know)

Q44a. Process for scheduling the initial visit to your home

1 2 3 4 5 98

Q44b. Initial visit and walk-through done on your home

1 2 3 4 5 98

Q44c. Attitude of contractor during initial visit and walk-through
1 2 3 4 5 98

Q44d. Computer report and explanation of how energy is used in your home
1 2 3 4 5 98

Q44e. Usefulness of the energy information reviewed during the visit
1 2 3 4 5 98

Q44f. The recommendations that were made to save energy in your home
1 2 3 4 5 98

Q44g. Convenience of any follow-up visit (for new refrigerator or weatherization work)
1 2 3 4 5 98

Q44h. Attitude of the contractors who installed measures during any second visit to your home 1 2 3 4 5 98

Q44i Quality of all work performed and materials installed through your participation in the program 1 2 3 4 5 98

Q44j. Helpfulness of program staff
1 2 3 4 5 98

Q44k. Electric bill savings as a result of the program
1 2 3 4 5 98

Q44l. Program overall
1 2 3 4 5 98

Q45. Could you please tell me one or two reasons for your overall program satisfaction rating of [READ RESPONSE TO Q44l.]?

_____

_____

Q46 Would you recommend this program to others?

1. Yes
2. No
98. (Don't know)

Finally, to end this interview, I would like to ask a few quick questions about you and your home.

DEMOGRAPHIC QUESTIONS

Q47. Do you own or rent your home?

1. Own

2. Rent
3. Other
98. (Don't know)

Q48. How many people live in your home year-round? _____

Q49. How many people who live in your home year-round are over the age of 65?__
_____

Q50. How many people who live in your home year-round are under the age of 18?_____

Q51. What is the highest level of schooling that you have completed?

1. Some high school or less
2. High school graduate
3. Some college
4. Technical / trade / vocational school or Associates degree
5. Four-year college graduate
6. Post-graduate or professional degree or training
98. (Refused to answer)

Q52. What range would you estimate your household's annual income was last year?

1. Less than $5,000
2. Between $5,000 and $10,000
3. Between $10,000 and $20,000
4. Between $20,000 and $30,000
5. Between $30,000 and $40,000
6. Between $40,000 and $50,000
7. Over $50,000
98. (Refused to answer)

Well, that's all of the questions that I have. Now, with your help, I'd like to look at the actual work that was done and energy efficiency items installed through the program.

After the walkthrough has been completed, interviewer should close with the following: **Thank you again for all of your time today. If you would like further information on Fitchburg Gas and Electric Light Company's energy savings programs, please call the Company directly or the Montachusett Opportunity Council (MOC).**

[Provide the following telephone numbers]
MOC: 978-342-7025
FG&E's Customer Service: 1-888-301-7700

Appendix B: On-Site Inspection Form

Conservation and Education Program Evaluation
Site Survey Form

General Information

Last Name: **Bennett** Account Number: 12345 (Provided well in advance of site visit)
First Name: **Joe**
Address: 123 Main St Apt. No. 1A
City/Town: Anytown State: MA Zip:

Building Data

Type: (SF/MF) (Provided well in advance of site visit)
Square Footage: Volume:
Heated Floors: Tenure Type: (Own/Rent)
Basement Type:

Bedrooms: # Showers: Heat Type: (FHA, FHW)
Bathrooms: # Sinks: Heat Fuel: (Oil, Gas, Propane or Electric)

Measures Received Through Program (Provided well in advance of site visit)

Measure	Location	Quantity	What was replaced
Pipe insulation 5/8"x 1/2"x 3'	BASEMENT	9	
Refrigerator Brush	overall	1	
Std. aerator (1.5gpm)	BATHROOM	1	
Flip aerator (2.5gpm)	KITCHEN	1	
18.0 CuFt GE TF-A	KITCHEN	1	
Spoiler showerhead (2.5gpm)	BATHROOM	1	
0	0	0	
0	0	0	
0	0	0	
0	0	0	

Lighting Data

CFL

Quality Rating		
3=Good	2=Fair	1=Poor

	(I,V)	(I,V)	(I,V)		(II)		(I,V)	(I,V)	(I,V)	(II)	
	Location	# of CFLs in Place	Wattage		Hrs of Use	Quality / Notes	Location	# of CFLs in Place	Wattage	Hrs of Use	Quality / Notes

Lost Opportunities: _____

Incandescents in high use areas? _____

CFLs in closets? _____

Fixtures

Quality Rating		
3=Good	2=Fair	1=Poor

	(I,V)	(I,V)	(I,V)		(II)		(I,V)	(I,V)	(I,V)	(II)	
	Location	No. Fixtures	Wattage		Hrs of Use	Quality of Installation	Location	No. Fixtures	Wattage	Hrs of Use	Quality / Notes

Lost Opportunities: _____

Incandescents in high use areas? _____

Water Heating System Data

Received through program? Quality

Location (Heated/Unheated): _____ Tank Wrap Installed?: _____(I,V) _____ _____ (II)
Tank Size: _____ gallons Pipe Insulation Installed?: _____(I,V) _____ _____ (II)
Tank Age/Manufacture Date: _____ Temperature Setback?: _____(I,V) _____

Heat Fuel: _____(I, V) # Sink Aerators: _____(I,V)
Showerheads: _____(I,V)

Quality Rating		
3=Good	2=Fair	1=Poor

Notes: _____

Lost Opportunities: _____

Heating System Data

Primary System Type: _____ Heat Fuel: _____(I, V) # of Thermostats / Type: _____

Location: _____

Secondary System Type: _____ Heat Fuel: _____(I, V) # of Thermostats / Type: _____

Location: _____ Missed Opportunities: _____

Duct Seal: _____

Building Envelope / Insulation Data

Quality Rating		
3=Good	2=Fair	1=Poor

Attic Type	(I,V) Insulated	(I) Through FG&E Program	(I,V) Insulation Type	(I,V) R-Value: Estimated	in P	Original	Added	(I,II,V) Ceiling joist size	Quality
Flat Ceiling:									
Vaulted Ceiling:									
Kneewall:									
Kneewall Floor:									
Attic Hatch:									
Other:									

Vapor barrier in place? _____(II)

Attic Properly Vented? _____(II) How? _____ridge _____gable _____roof _____mechanical

Building Envelope / Insulation Data (Continued)

Basement

Type	(I,II,V) Heated	(I,II,V) Finished	(I,II,V) Insulation Type	(I,II,V) Estimated R-Value	(II) Quality
Full					
Crawl Space					

Quality Rating		
3=Good	2=Fair	1=Poor

Notes: _____

Weatherstripping

(I,II,V) Location	(I,V) Type	(I,V) Linear Feet	(II) Quality	(I,II,V) Location	(I,V) Type	(I,V) Linear Feet	(II) Quality

Quality Rating		
3=Good	2=Fair	1=Poor

Notes: _____

Refrigerator Data

Received through program? _____ (I.)

Make: _____ (I,V) Condition: _____ (I,III,V)

Model: _____ (I,V) Coils: _____ (I,III,V)

Size: _____ (I,V) Age: _____ (I,V)

Metered time: _____ Metered Usage: _____ (kWh/yr)

Old Ref. Info.	
Old Make	
Old Model	
Old Size	

Notes: _____